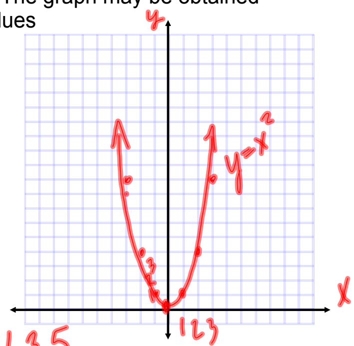
L1(5.1)-Reflecting & Stretching Quadratic Relations

$y = x^2$ is known as the parent function for all quadratic relations. The graph may be obtained from the table of values

x	$y = x^2$
-2	4
-1	1
0	0
1	1
2	4



The pattern is: 1, 3, 5.
It is called the step pattern.

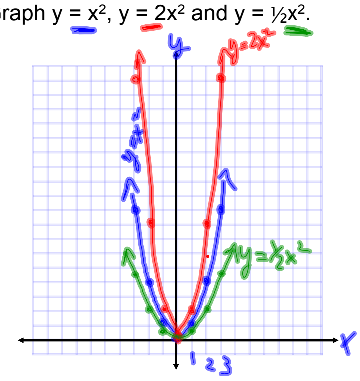
Compare the graphs and TOV for $y = x^2$, $y = 2x^2$, and $y = \frac{1}{2}x^2$.

x	$y = x^2$	$y = 2x^2$		$y = \frac{1}{2}x^2$	
-3	9	18	10	4.5	2.5
-2	4	8	6	2	1.5
-1	1	2	2	0.5	0.5
0	0	0		0	
1	1	2		0.5	
2	4	8		2	
3	9	18		4.5	
Step Patterns:	1, 3, 5	2, 6, 10		0.5, 1.5, 2.5	

What do you notice about the step pattern?

multiple a by 1, 3, 5

Graph $y = x^2$, $y = 2x^2$ and $y = \frac{1}{2}x^2$.



$y = x^2$, a = 1, so a > 0, parabola opens **up**

$y = -x^2$, a = -1, so a < 0, parabola opens **down.**

We say this parabola has been **vertically reflected**, or reflected along the x-axis. negative

When 'a' is a number other than 1 or -1, In general we say that parabola ($y = x^2$) has been **vertically scaled**.

Note: For a vertical scaling, we only care about the size, or magnitude, of 'a', so we ignore the sign. This is called the "absolute value", and has the symbol |a|.

When |a| > 1, the graph of y = x^2 gets thinner. The parent function undergoes a vertical stretch.

e.g., y = $2x^2$ or y = $4x^2$ or y = $-2x^2$

When 0 < |a| < 1, the graph of y = x^2 gets wider. The parent function undergoes a vertical compression.

e.g., y = $0.5x^2$ or y = $-0.66x^2$ or y = $-0.00005x^2$

Ex.1. Describe the transformations to $y = x^2$ that yield the following:

(a) $y = \frac{1}{4}x^2$

$\frac{1}{4}, \frac{3}{4}, \frac{5}{4}$

Vertical compression by factor of $\frac{1}{4}$

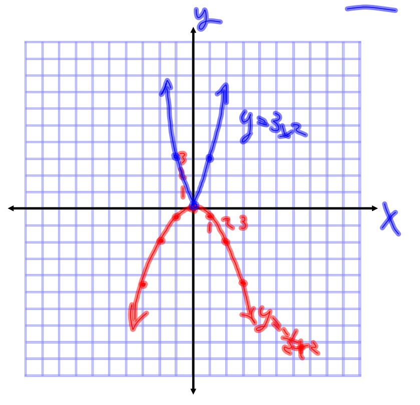
(b) $y = -3x^2$

-3, -9, -15

reflection in the x axis

Vertical stretch by a factor of 3

Ex. 2. Graph (a) $y = -0.5x^2$ (b) $y = 3x^2$



Assigned Work:

p. 256 # 1, 2, 4 ,5 ,8